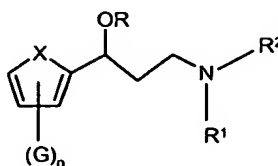


CLAIMS

1. A process for the preparation of a compound of Formula (1):

5



Formula (1)

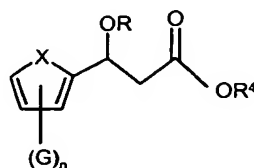
wherein:

- 10 X is S, O or NR³, wherein R³ is H or an organic group;
R is H or an organic group;
R¹ and R² each independently are H, optionally substituted alkyl or optionally substituted aryl;
G is a substituent; and
15 n is 0 to 3;

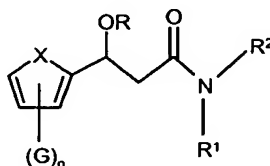
which comprises the steps:

- (a) reacting a compound of Formula (2) with a compound of Formula NHR¹R² to give a compound of Formula (3):

20



Formula (2)



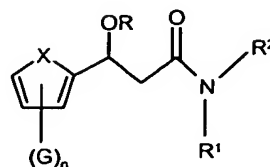
Formula (3)

25

wherein X, R, G and n are as defined above and R⁴ is optionally substituted alkyl, optionally substituted alkenyl, optionally substituted alkynyl, optionally substituted aryl, optionally substituted heteroaryl or a combination thereof; and

- 30 (b) reducing the compound of Formula (3) to give a compound of Formula (1).

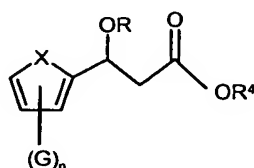
2. A process for the preparation of a compound of Formula (3):



Formula (3)

5

whereby a compound of Formula (2):



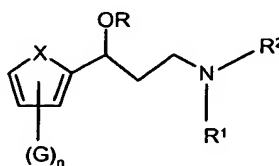
Formula (2)

10

is reacted with a compound of Formula NHR¹R² to give a compound of Formula (3); wherein X, G, n, R, R¹, R² and R⁴ are as defined in claim 1.

3. A process for the preparation of a compound of Formula (1):

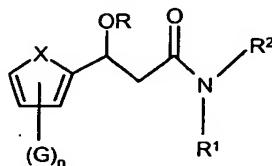
15



Formula (1)

in which a compound of Formula (3):

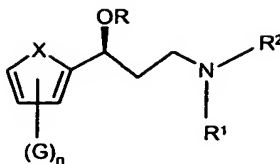
20



Formula (3)

- 25 is reduced to give a compound of Formula (1): wherein X, G, n, R, R¹ and R² are as defined in claim 1.

4. A process according to any one of claims 1 and 3 wherein the compounds of Formula (1) are of Formula (4):



Formula (4).

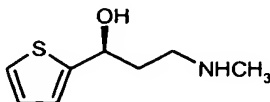
wherein X, G, n, R, R¹ and R² are as defined in claim 1.

5. A process according to any one of the preceding claims wherein X is S.

6. A process according to any one of the preceding claims wherein R is H or naphthyl.

7. A process according to any one of the preceding claims wherein one of R¹ and R² is H and the other is methyl.

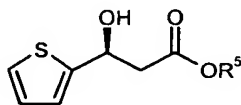
8. A process, according to any one of the preceding claims, for the preparation of a compound of Formula (10):



Formula (10)

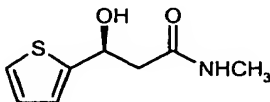
which comprises the steps:

(a) reacting a compound of Formula (9):



Formula (9)

where R⁵ is optionally substituted C₁₋₈alkyl, with methylamine to give a compound of Formula (11):

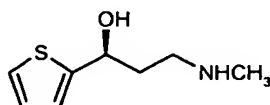


Formula (11)

and

(b) reducing the compound of Formula (11) to give the compound of Formula (10).

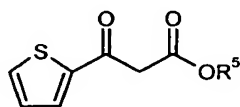
9. A process, according to any one of the preceding claims, for the preparation of a
5 compound of Formula (10):



Formula (10)

which comprises the steps:

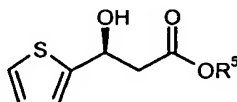
- 10 (i) acetylating 2-acetyl thiophene to give the compound of Formula (8):



Formula (8)

- 15 where R⁵ is optionally substituted C₁₋₈alkyl;

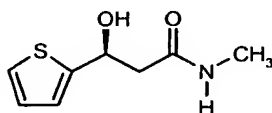
- (ii) reducing the compound of Formula (8) to give the compound of Formula (9):



Formula (9)

where R⁵ is optionally substituted C₁₋₈alkyl;

- (iii) reacting a compound of Formula (9) with methylamine to give a compound of
25 Formula (11):

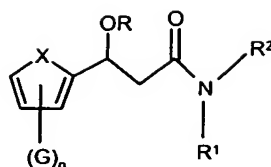


Formula (11)

30 and

- (iv) reducing the compound of Formula (11) to give the compound of Formula (10).

10. A compound of Formula (3):



Formula (3)

5 wherein

X is S, O or NR³, wherein R³ is H or an organic group;

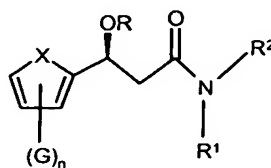
R is H or an organic group;

R¹ and R² each independently are H, optionally substituted alkyl or optionally substituted aryl;

10 G is a substituent; and

n is 0 to 3.

11. A compound of Formula (3), according to claim 10, of Formula (12):



Formula (12)

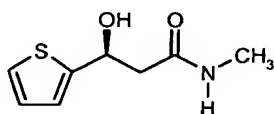
wherein X, G, n, R, R¹ and R² are as defined in claim 10.

12. A compound according to either claim 10 or claim 11 wherein X is S.

13. A compound according to any one of claims 10 to 12 wherein R is H or naphthyl.

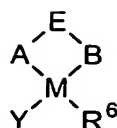
14. A compound according to any one of claims 10 to 13 wherein one of R¹ and R² is H and the other is methyl.

15. A compound according to any one of claims 10 to 14 of Formula (11):



Formula (11)

16. A catalyst of formula:



wherein:

5 R^6 represents a neutral optionally substituted hydrocarbyl, a neutral optionally substituted perhalogenated hydrocarbyl, or an optionally substituted cyclopentadienyl ligand;

A represents an optionally substituted nitrogen;

B represents an optionally substituted nitrogen, oxygen, sulphur or phosphorous;

E represents a linking group;

10 M represents a metal capable of catalysing transfer hydrogenation; and

Y represents an anionic group, a basic ligand or a vacant site;

provided that at least one of A or B comprises a substituted nitrogen and the substituent has at least one chiral centre; and

15 provided that when Y is not a vacant site that at least one of A or B carries a hydrogen atom.

17. A catalyst according to Claim 16 wherein A represents NR^7- , $-NR^8-$, $-NHR^7$, $-NR^7R^8$ or $-NR^8R^9$ where R^7 is H, $C(O)R^9$, SO_2R^9 , $C(O)NR^9R^{13}$, $C(S)NR^9R^{13}$, $C(=NR^{13})SR^{14}$ or $C(=NR^{13})OR^{14}$, R^8 and R^9 each independently represents an optionally substituted hydrocarbyl, perhalogenated hydrocarbyl or an optionally substituted heterocyclyl group, and R^{13} and R^{14} are each independently hydrogen or a group as defined for R^9 ; and B represents $-O-$, $-OH$, OR^{10} , $-S-$, $-SH$, SR^{10} , $-NR^{10}-$, $-NR^{11}-$, $-NHR^{11}$, $-NR^{10}R^{11}$, $-NR^{10}R^{12}$, $-PR^{10}-$ or $-PR^{10}R^{12}$ where R^{11} is H, $C(O)R^{12}$, SO_2R^{12} , $C(O)NR^{12}R^{15}$, $C(S)NR^{12}R^{15}$, $C(=NR^{15})SR^{16}$ or $C(=NR^{15})OR^{16}$, R^{10} and R^{12} each independently represents an optionally substituted hydrocarbyl, perhalogenated hydrocarbyl or an optionally substituted heterocyclyl group, and R^{15} and R^{16} are each independently hydrogen or a group as defined for R^{12} ; provided that at least one of A or B comprises a substituted nitrogen and the substituent, represented by R^7 , R^8 , R^9 , R^{10} , R^{11} or R^{12} , has at least one chiral center.

30 18. A catalyst according to Claim 17 wherein A represents $-NR^7-$, $-NR^8-$, $-NHR^7$, $-NR^7R^8$ or $-NR^8R^9$ where R^7 is H, $C(O)R^9$, SO_2R^9 , $C(O)NR^9R^{13}$, $C(S)NR^9R^{13}$, $C(=NR^{13})SR^{14}$ or $C(=NR^{13})OR^{14}$, R^8 and R^9 each independently represents an optionally substituted hydrocarbyl, perhalogenated hydrocarbyl or an optionally substituted heterocyclyl group, and R^{13} and R^{14} are each independently hydrogen or a group as defined for R^9 ; and B represents $-NR^{10}-$, $-NR^{11}-$, $-NHR^{11}$, $-NR^{10}R^{11}$, or $-NR^{10}R^{12}$ where R^{11} is H, $C(O)R^{12}$, SO_2R^{12} , $C(O)NR^{12}R^{15}$, $C(S)NR^{12}R^{15}$, $C(=NR^{15})SR^{16}$ or $C(=NR^{15})OR^{16}$, R^{10}

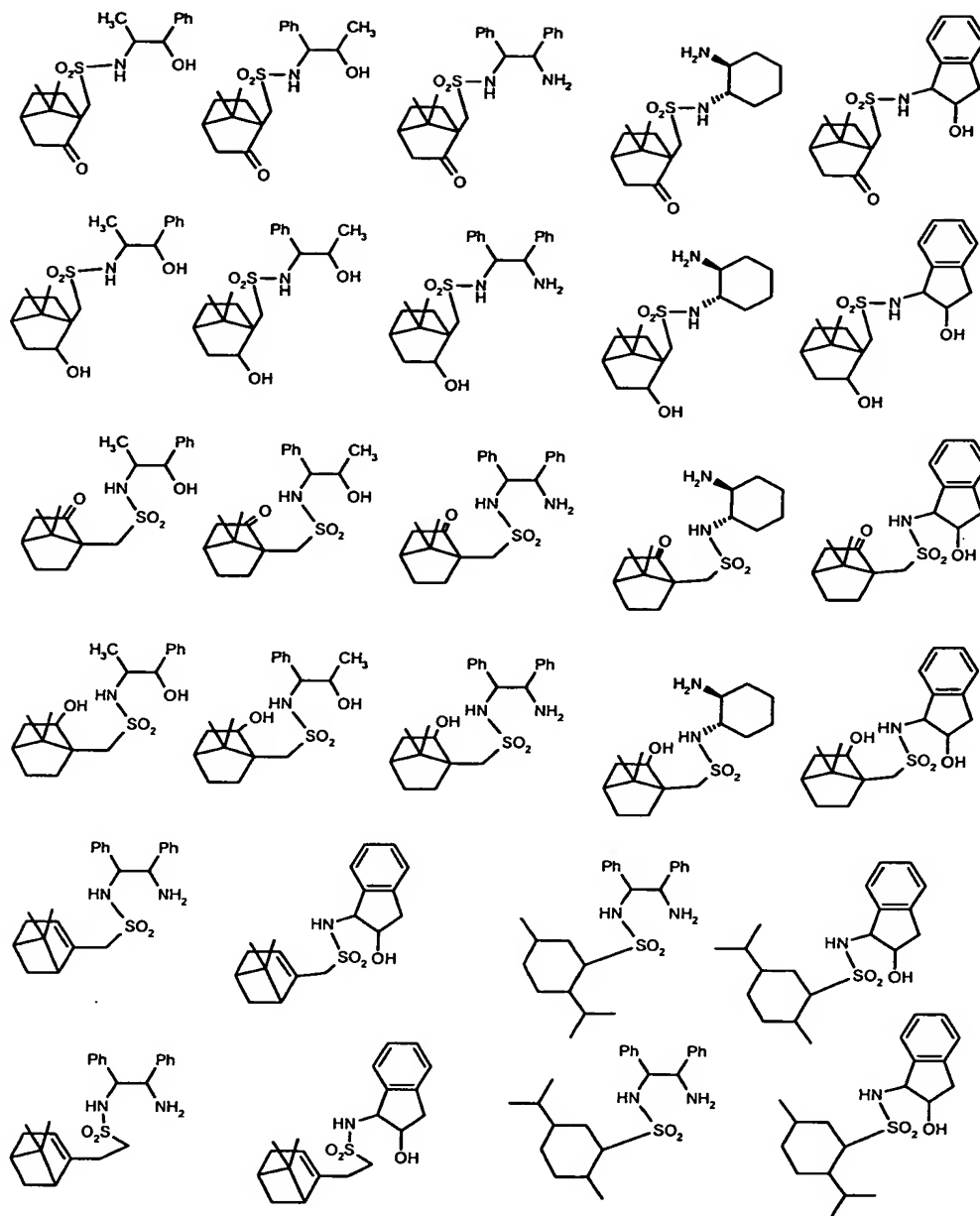
and R^{12} each independently represents an optionally substituted hydrocarbyl, perhalogenated hydrocarbyl or an optionally substituted heterocyclyl group, and R^{15} and R^{16} are each independently hydrogen or a group as defined for R^{12} ; provided that at least one of A or B comprises a substituted nitrogen and the substituent, represented by R^7 , R^8 , R^9 , R^{10} , R^{11} or R^{12} , has at least one chiral center.

19. A catalyst according to Claims 17 or 18 wherein either A or B is present as a sulphonamide group represented by $-NR^7$ -, $-NHR^7$, NR^7R^8 -, $-NR^{11}$ -, $-NHR^{11}$ or $NR^{10}R^{11}$ wherein R^8 and R^{10} are as hereinbefore defined, and where R^7 or R^{11} is a sulphonyl group represented by $-S(O)_2R^9$ or $-S(O)_2R^{12}$, that R^9 and R^{12} is an optionally substituted hydrocarbyl, perhalogenated hydrocarbyl or an optionally substituted heterocyclyl group having at least one chiral center.

20. A catalyst according to Claim 19 wherein one of R^7 or R^{11} is (1R) 1-(7,7-dimethyl-2-oxobicyclo[2.2.1]hept-1-yl)methanesulfonyl, (1S) 1-(7,7-dimethyl-2-oxobicyclo[2.2.1]hept-1-yl)methanesulfonyl, (1R,2S) 1-(7,7-dimethyl-2-hydroxybicyclo[2.2.1]hept-1-yl)methanesulfonyl, (1R,2R) 1-(7,7-dimethyl-2-hydroxybicyclo[2.2.1]hept-1-yl)methanesulfonyl, (1S,2R) 1-(7,7-dimethyl-2-hydroxybicyclo[2.2.1]hept-1-yl)methanesulfonyl, (1S,2S) 1-(7,7-dimethyl-2-hydroxybicyclo[2.2.1]hept-1-yl)methanesulfonyl, (2S) 1-(6,6-dimethylbicyclo[3.1.1]hept-2-ene)-2-ethansulfonyl, (2R) 1-(6,6-dimethylbicyclo[3.1.1]hept-2-ene)-2-ethansulfonyl, (2S) 1-(6,6-dimethylbicyclo[3.1.1]hept-2-ene)-2-methansulfonyl, (2R) 1-(6,6-dimethylbicyclo[3.1.1]hept-2-ene)-2-methansulfonyl, (1R,2R,5R) 5-isopropyl-2-methylcyclohexansulfonyl, or (1S,2S,5R) 5-isopropyl-2-methylcyclohexansulfonyl, (1S,2S,5R) 2-isopropyl-5-methylcyclohexansulfonyl.

21. A catalyst according to any one of Claims 16 to 20 wherein E is a linking group such that A and B are linked through 2, 3 or 4 atoms which are optionally substituted.

22. A ligand of formula:



5

and diastereomers or resolved forms thereof.